



**THE
ONTARIO WATER RESOURCES
COMMISSION**

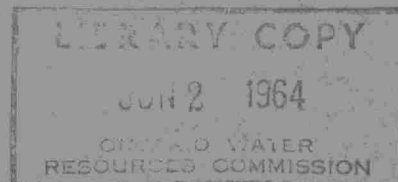
REPORT ON

**LAKEHEAD AREA
WATER POLLUTION SURVEY**

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JANUARY 1960

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THE
ONTARIO WATER RESOURCES COMMISSION

Report on

LAKEHEAD AREA

WATER POLLUTION SURVEY

January 1960

Parliament Buildings- Toronto

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LAKEHEAD AREA POLLUTION SURVEY

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LAKEHEAD AREA POLLUTION SURVEY

SUMMARY AND RECOMMENDATIONS

I Summary

Pollution exists in the streams and lakefront area of the Lakehead. At present it is caused by both sanitary sewage and industrial waste. The worst conditions exist along the lakefront and in the Kam and Neebing Rivers as they pass through Fort William and Port Arthur. The watercourses in Neebing and Shuniah in general are of good quality. This can be attributed in part to the lack of extensive industrial and residential development.

The present sewerage plans for Port Arthur and Fort William indicate that adequate treatment of sanitary and some industrial wastes will be provided by these cities in the near future.

The condition of the watercourse in Neebing and Shuniah will deteriorate with future industrial and residential development, unless an adequate sewerage plan is adopted. For the most efficient and economical servicing of the area all new sewer and sewage treatment plans should be based on an overall scheme for the four municipalities of Fort William, Port Arthur, Neebing and Shuniah.

Much of the pollution in the area is caused by industrial wastes. This has resulted in most of the lakefront

area being contaminated with phenol. In addition, wood fibre in the water has been the cause of complaints by commercial fishermen, cottage owners and water consumers. The industries contributing much of the contamination are: Provincial Pulp and Paper Company Limited, Abitibi Power and Paper Company, Thunder Bay and Mission mills, Great Lakes Paper Company, Ogilvie Flour Mills Limited, and Northern Wood Preservers Limited. These wastes will not be treated at the municipal sewage treatment plants.

The pulp and paper mills can provide for wood fibre removal by installing or improving either lagoons or some form of suspended solids removal equipment. This should be considered as the necessary first step in waste treatment and should be proceeded with as soon as possible. When such installations become adequate the presence of wood fibre in the water will still be a problem at the Port Arthur water works, because considerable quantities of wood fibre are now deposited on the lake bottom. This material will continue to rise and float into the intake during times of storm. This can be removed readily in a water filtration plant which would ensure a satisfactory quality water at all times.

Phenol treatment at the pulp and paper mills can be most effectively achieved by substituting non-phenolic type slime control agents for those presently being used. This is at present being practised at some of the mills. The treatment of phenol at the Northern Wood Preservers Limited poses a more difficult problem and should receive further study.

At the present time there is no acceptable economical method of reducing the high B.O.D. content of the pulp and paper mill waste. This problem should receive top priority by the recently formed, pollution abatement committee of the area mills.

In addition to phenol treatment the Northern Wood Preservers Limited, should consider oil removal. This can be affected in a conventional type oil-water separator. There is also some suspended solids present in this waste which possibly can be effectively treated by proper in-plant care.

The volume of waste produced at the Ogilvie Flour Mills Limited is relatively small, however, it is excessively strong on the basis of the 5 Day B.O.D. test. For this reason conventional forms of treatment will probably not produce an effluent of satisfactory quality, and it will be necessary to provide complete elimination.

Complaints concerning pollution in the area were made by commercial fishermen, cottage owners, officials of the Port Arthur Public Utilities Commission and home-owners in the low-lying areas of the Neebing River.

The commercial fishermen revealed that wood fibre had covered the fish spawning areas near the harbour and that the flesh of fish caught in the area were tainted with industrial waste. This could be attributed to oil and phenol wastes.

Cottage owners in the Silver Beach area of Shuniah have been subjected to beach pollution by wood fibre. This can be attributed in part to log booming operations. Wood

fibre is produced by these logs rubbing together especially in times of storm and producing fibre and bark. There does not appear to be an economical method of controlling the waste produced by these operations. Wood fibre waste, which is ground wood or chemical wood fibre, produced at the pulp and paper mills can be controlled.

Wood fibre and some chemical wood fibre cause contamination to the Port Arthur water supply. As discussed one effective method of controlling this problem at the water works is the installation of a modern water filtration plant.

There is frequent flooding of basements in the low-lying areas near the mouth of the Neebing River. As the river contains much sanitary sewage this presents a public health objection. Proposed municipal sewerage plans should eliminate this problem.

In addition, there is the possibility of wood fibre contamination to the process water supply for the Ontario Hydro Steam Generating Plant now being constructed at the mouth of the Mission River. At times of high water level in Lake Superior and easterly winds, wastes from the Abitibi Mission mill may be carried to the Hydro plant intake.

II Recommendations

1. The four municipalities of Fort William, Port Arthur, Neebing and Shuniah should adopt a plan for the future sewer development of the area.

Port Arthur

2. The sewerage plan recommended by the city's consulting engineer should be implemented as soon as possible.
3. The Provincial Paper Company should provide satisfactory treatment for suspended solids removal as soon as possible.
4. The Abitibi Power and Paper Company Limited, Thunder Bay, should continue its efforts at reducing the suspended solids in the mill effluent.
5. At both paper mills:
 - (a) phenol should be satisfactorily treated or removed from the mill wastes as soon as possible.
 - (b) every effort should be made to develop an efficient method of B.O.D. reduction in the wastes.
- 6a. The Northern Wood Preservers Limited, should provide effective treatment for suspended solids and oil.
- b. Consideration should be given to the adequate reduction of phenol.

Fort William

7. The sewerage plan recommended by the city's consulting engineer should be implemented as soon as possible.
8. The Abitibi Power and Paper Company Limited, Mission mill, should provide satisfactory treatment for suspended solids

removal as soon as possible.

b. Phenol should be satisfactorily treated or removed from the mill waste as soon as possible.

c. Every effort should be made to develop an efficient method of B.O.D. reduction in the wastes.

9. The Ogilvie Flour Mills Limited, should provide satisfactory treatment for the plant waste.

Neebing

10. A further investigation should be made of the phenol pollution and the possibility of sanitary sewage contamination in the Neebing River.

11. The Great Lakes Paper Company should provide satisfactory treatment for suspended solids removal, as soon as possible.

b. Every effort should be made to develop an efficient method of B.O.D. reduction.

Shuniah

12. Local authorities should investigate the reason for sanitary sewage pollution in the McIntyre River near the Golf Links Road.

LAKEHEAD AREA POLLUTION SURVEY

GENERAL

I Purpose and Extent

The purpose of this survey was to study the amount and extent of water pollution in the lakehead area and to establish a method for control and abatement. Samples were obtained from the rivers and streams, the harbour area, and from Thunder Bay.

Discussions were held with municipal officials and persons affected by pollution, i.e., commercial fishermen, cottage owners and those using the water for recreation, or for domestic or industrial consumption.

II Sampling Procedures and Terms

Samples were taken from the surface, at various depths and from the bottom of the watercourses. The following tests were applied to the surface and depth samples:

5 Day B.O.D. (Biochemical Oxygen Demand)- a measurement of the amount of oxygen required to stabilize by aerobic decomposition the organic material in the sample.

Solids- Total, Suspended, Dissolved

Turbidity- in silica units.

Phenols- chemical compound which gives a blue colour with Gibbs reagent.

Ether Solubles- substances which are soluble in a 50% by 50% by volume solution of carbon tetrachloride and diethyl ether, such as oil or greases.

Bacteriological- recorded as Indicated Number of Total Coliform per 100 cc. and is a measure of the amount of sanitary sewage present. Owing to the number of dilutions used, the maximum count recorded is 1,000,000/100 cc.

All bottom samples and the solids from some of the surface and depth samples were examined visually and by staining in order to determine their source. The staining procedure produces colours characteristic of various chemical wood fibre extraction methods employed at pulp and paper mills. It should be noted that there is some difficulty in determining whether wood fibre in a sample is from actual mill operations, i.e., ground wood or from the rubbing action of logs in booms as they are being transported to the mills.

The bacteriological samples were tested at the Ontario Department of Health Laboratory in Fort William. All other samples were tested at the Ontario Water Resources Commission Laboratory in Toronto.

In order for clarity the following definition of terms should be used for this report:

- wood fibre- this includes chemically extracted wood fibre, mechanically extracted wood fibre and the wood fibre produced by the rubbing of logs in booms.
- chemical wood fibre- wood fibre extracted from logs by chemicals.
- ground wood- wood fibre extracted from logs by mechanical grinding and screening.
- log boom fibre- wood fibre rubbed off logs during booming operations.

III Commission Objectives

The objectives for water quality set by the Commission

are that all wastes, including sanitary sewage, storm water and industrial effluents, shall be in such condition that they will not create conditions which will adversely affect the use of these waters for the following purpose; source of domestic water supply, navigation, fish and wildlife, bathing, recreation, agriculture and other riparian activities.

For convenience in the interpretation of laboratory analyses it may be taken as an objective that pollution in streams or lakes should not exceed the following figures:

5 Day B.O.D.- 4 p.p.m.(parts per million)

Suspended Solids- this varies depending on the watershed, but satisfactory conditions will prevail if drains or effluents are limited to 15 p.p.m.

Phenols- after initial dilution an average of 2 ppb. (parts per billion) and a maximum of 5 ppb.

Ether Solubles- oil and floating solids should be reduced to a point such that they will not create fire hazards, coat boat hulls, injure fish or wildlife or their habitat or will adversely affect public or private recreational development or other legitimate shore line development or uses. Protection should be provided if effluents or drains do not contain oils in excess of 15 p.p.m. or a sufficient amount to create more than a faint irridescence.

Total Coliform Indicated Number per 100 cc.- 1000

LAKEHEAD AREA POLLUTION SURVEY

PORT ARTHUR

I Lakefront Area

(1) Water Use and Complaints

The lakefront area water is used extensively by commercial shipping, for transportation of log booms, as an industrial and municipal water supply, and for commercial and private fishing. There are no developed public beaches, and there is very limited swimming along the Port Arthur waterfront.

Complaints concerning pollution of this water were made by the municipal water works officials and by commercial fishermen. It was indicated that wood fibre waste enters the city intake and the distribution system. The fibres are quite small and are not readily apparent, but they deposit and build up in low flow areas of the distribution system. These accumulated masses of fibre are eventually sloughed off by pressure changes and discharged at the consumers' taps. The intermittent discharge of this material has been the cause for many complaints in the past.

Commercial fishermen report that they can no longer catch fish in the Port Arthur area. It is now necessary for them to set their nets farther from the cities. They attribute this to wood fibre covering the bottom in the

spawning areas. In addition, the flesh of fish caught in the harbour area is tainted with industrial wastes.

(2) Sampling Results

Port Arthur- Thunder Bay(T.B.)

SAMPLE NO.	SAMPLING DATE	DESCRIPTION	5 DAY SOLIDS(P.P.M.)			PHENOL P.P.M.	TOTAL COLIFORM COUNT IND. NO./100 CC.
			B.O.D.	TOTAL	SUSP.	DISS.	
P1.1	SEPT.9	THUNDER BAY-MOUTH	2.2	92	10	82	8
	SEPT.15	OF NEEBING RIVER	1.1	70	8	62	8
	SEPT.16		1.5	70	12	58	10
P2.1	SEPT.9	T.B.- 500' FROM	2.8	100	8	92	22
	SEPT.15	MOUTH OF MCINTYRE	1.3	62	6	56	6
	SEPT.16	RIVER	1.6	--	--	--	4
P3.1	SEPT.9	T.B.- 100' FROM	74.0	152	28	124	500
	SEPT.15	OUTFALL- NORTHERN	1.7	--	6	--	4
	SEPT.16	WOOD PRESERVERS	1.7	92	20	72	5
P3.2	SEPT.9	T.B.- 500' SOUTH	1.2	84	20	64	9
	SEPT.15	OF P3.1	8.8	--	10	--	20
	SEPT.16		1.6	--	14	--	4
P3.3	SEPT.9	T.B.- 500' SOUTH	1.6	74	8	66	9
	SEPT.15	OF P3.2	1.6	--	10	--	4
	SEPT.16		3.0	--	20	--	4
P3.4	SEPT.9	T.B.- 500' EAST	3.0	72	8	64	9
	SEPT.15	OF P3.1	2.0	--	10	--	5
	SEPT.16		1.6	78	16	62	4
P3.5	SEPT.9	T.B.- 500' EAST	1.9	80	4	76	10
	SEPT.15	OF P3.4	2.1	--	8	--	3
	SEPT.16		1.2	--	14	--	5
P3.6	SEPT.9	T.B.- 500' NORTH	5.2	82	28	54	22
	SEPT.16	OF P3.1	1.6	--	10	--	3
	SEPT.16		1.6	86	18	68	3
P3.7	SEPT.9	T.B.- 500' NORTH	1.9	76	12	58	25
	SEPT.15	OF P3.6	1.4	--	4	--	0
	SEPT.16		1.4	84	18	66	3
P4	SEPT.9	T.B.- 500' FROM	1.6	76	10	66	12
	SEPT.15	WILSON ST.	1.8	--	8	--	6
	SEPT.16	SEWER OUTFALL	1.6	96	16	80	3
P5	SEPT.9	T.B.- 500' FROM	2.1	76	8	68	15
	SEPT.15	RIVER ST. SEWER	1.7	--	6	--	6
	SEPT.16	OUTFALL	1.1	76	16	60	4
P6	SEPT.9	T.B.- MOUTH OF	1.5	104	8	8	96
	SEPT.15	MCVICAR CREEK	1.0	--	12	12	--
	SEPT.16		2.0	--	20	20	--
P7	SEPT.9	T.B.- 500' FROM	2.4	82	8	74	12
	SEPT.15	CLARK ST. SEWER	2.2	--	12	--	8
	SEPT.16	OUTFALL	1.3	78	14	64	40
P8	SEPT.9	T.B.- 500' FROM	1.4	106	8	98	8
	SEPT.15	MOUTH OF CURRENT	2.6	--	10	--	10
	SEPT.16	RIVER	1.8	80	16	64	7

SAMPLE NO.	SAMPLING DATE	DESCRIPTION	5 DAY B.O.D.	SOLIDS (P.P.M.)			PHENOL PPB.	TOTAL COLIFORM COUNT IND. NO./100 CC.
				TOTAL	SUSP.	DISS.		
P9.1	SEPT. 9	T.B.- 100' FROM PROVINCIAL MILL OUTFALL	68.0	446	258	188	12	100,000
P9.2	SEPT. 9 SEPT. 15	T.B.- 500' SOUTH OF P9.1	44.0 2.6	372 --	212 6	160 --	10 10	1,000 --
P9.3	SEPT. 9 SEPT. 15 SEPT. 16	T.B.- 500' SOUTH OF P9.2	20.0 1.8 7.5	108 -- 7.5	18 12 28	90 -- 70	25 10 30	10,000 -- 10,000
P9.4	SEPT. 15 SEPT. 16	T.B.- 500' EAST OF P9.1	8.6 76.0	-- 300	22 38	-- 262	15 0	-- --
P9.5	SEPT. 15 SEPT. 16	T.B.- 500' EAST OF P9.2	264.0 6.2	1126 134	50 34	1076 110	0 30	10,000 --
P9.5A	SEPT. 9 SEPT. 15 SEPT. 16	T.B.- 500' EAST OF P9.5 BOTTOM SAMPLE	CONTAINED WOOD FIBRE 6.5 6.9	76 126	10 26	66 110	25 25	-- --
P11.1		T.B.- 100' FROM ABITIBI MILL OUTFALL	NOT OBTAINED					
P11.2	SEPT. 16	T.B.- 500' SOUTH OF ABITIBI MILL OUTFALL	0.9	88	8	80	3	--
P11.3	SEPT. 15 SEPT. 15 SEPT. 16	T.B.- 500' SOUTH OF P11.2	1.1 BARK PRESENT 1.0	-- 74	12 4	-- 70	7 3	-- --
P11.4	SEPT. 15 SEPT. 16	T.B.- 500' EAST OF P11.1	26.0 52.0	156 274	16 26	140 248	700 0	1,000 --
P11.5	SEPT. 15 SEPT. 15	T.B.- 500' EAST OF P11.4	1.1 1.2	-- 70	12 10	-- 60	5 3	100
P11.5A	SEPT. 16 SEPT. 16 SEPT. 16	T.B. 1/2 MILE FROM ABITIBI OUTFALL 25 FT. DEPTH BOTTOM SAMPLE	2.4 WOOD FIBRE PRESENT	78	16 62	15	15	--
P11.6	SEPT. 16	T.B.- 500' NORTH OF P11.1	.9	--	4	--	3	--
P11.7	SEPT. 15 SEPT. 15 SEPT. 16	T.B.- 500' NORTH OF P11.6 BOTTOM SAMPLE	1.7 1.4 WOOD FIBRE PRESENT	-- --	14 4	-- --	4 3	-- --
P12	SEPT. 16	T.B.- CITY WATER INTAKE	2.2	--	4	--	2	100
P12A	SEPT. 15 SEPT. 16	T.B. 30' DEPTH AT CITY WATER INTAKE WOOD FIBRE PRESENT T.B. 25' DEPTH AT CITY WATER INTAKE WOOD FIBRE PRESENT	1.2 1.6	-- --	6 16	-- --	0 2	-- 0
P12B	SEPT. 15	T.B. CITY WATER INTAKE AT BOTTOM 50 FT. DEPTH	8.4 WOOD FIBRE PRESENT	-- 122	-- --	6	6	

The bacteriological samples indicate that there is pollution of most of the city lakefront area by sanitary sewage.

Contamination is greatest opposite the mouths of the watercourses and sewer outfalls. The water in the area of the intake is of good bacteriological quality.

The chemical samples show that the pollution is greatest in the immediate area of the two paper mills and the creosoting plant. Phenol pollution is confirmed in the waste discharge from these three industries. The high phenol content in the sample obtained opposite the Clarke Street sewer on September 16th, was most likely caused by the waste from the Provincial Paper Company. The wind was from the north-east at this time, and there was also a high phenol content in sample P9.3 which is representative of the waste from the mill on that date. The phenol pollution is general in the area inside the break-wall and diminishes to a maximum of 2 ppb. at the outer edge of Thunder Bay.

On the basis of 5 Day B.O.D., the strongest wastes are noted in the area of the three observed industries. The dilution is sufficient to reduce the B.O.D. below 4 p.p.m. within 1000 feet of the outfall at the Abitibi mill and the creosoting plant. This objective is not obtained in the area of the Provincial mill. In addition, heavy pollution is indicated opposite the mouth of McVicar Creek.

The highest concentration of suspended solids is noted in the area of the Provincial Paper Company.

Oil pollution was present in the waste from the Northern Wood Preservers. This became rapidly dispersed and was not noticeable at a distance of 1000 feet from the outfall.

Bottom samples illustrated that there was wood fibre and some chemical fibre at the North Gap. This is approximately three-quarters of one miles from the Provincial Paper Company outfall. Wood fibre was obtained from the bottom at a point one-half of one mile east of the Abitibi outfall and also in the area of the mouth of the city water intake. During the pilot studies for the city water works micro-strainer it was established that some of this material was chemical fibre.

II Inland Watercourses

(1) Neebing River

(a) Water Use

The Neebing River flows easterly from the Fort William boundary and extends for one mile through Port Arthur before entering Thunder Bay. It is used to a limited extent by small private boats. There is no residential housing in this area.

(b) Sampling Results

<u>Port Arthur- Neebing River</u>							
SAMPLE NO.	SAMPLING DATE	DESCRIPTION	5 DAY B.O.D.	SOLIDS TOTAL	(P.P.M.) SUSP. DISS.	PBENOL PPB.	TOTAL COLIFORM IND. NO. PER 100CC.
FN2	SEPT. 10	NEEBING RIVER	5.4	214	20	194	1,000,000
	SEPT. 15	(DOWNSTREAM)	37.0	246	58	188	1,000,000
	SEPT. 17	FROM FT. WILLIAM S.T.P.	11.0	210	38	172	1,000,000
PI.1	SEPT. 9	THUNDER BAY-	2.2	92	10	82	1,000
	SEPT. 15	MOUTH OF	1.1	70	8	62	100
	SEPT. 16	NEEBING RIVER	1.5	70	12	58	10,000

The sampling results show that much of the pollution in the river comes from Fort William. This becomes more diluted as it approaches the mouth of the river.

(2) McIntyre River

(a) Water Use

There is no significant industrial or commercial development along this section of the McIntyre River. The river will eventually receive the effluent from the Port Arthur sewage treatment plant, which is now under construction.

(b) Sampling Results

Port Arthur- McIntyre River

SAMPLE NO.	SAMPLING DATE	DESCRIPTION	5 DAY	SOLIDS (P.P.M.)			PHENOL PPB.	TOTAL COLIFORM COUNT IND. No./100cc
			B.O.D. P.P.M.	TOTAL	SUSP.	DISS.		
PM 2	SEPT. 9	MAY ST. BRIDGE	3.6	146	8	138	2	1,000
	SEPT. 15		2.4	138	10	128	--	1,000
PM 1A	SEPT. 15	MAY ST. BRIDGE DOWNSTREAM FROM PT. ARTHUR S.T.P.	2.6	112	10	102		10,000
PM 1	SEPT. 9	MOUTH OF MCINTYRE RIVER	3.1	148	22	126	10	1,000
	SEPT. 16		1.6	100	12	88	4	1,000
P2.1	SEPT. 9	THUNDER BAY-500'	2.8	100	8	92	22	100,000
	SEPT. 15	E. OF MOUTH OF	1.3	62	6	56	6	1,000
	SEPT. 16	MCINTYRE RIVER	1.6				4	10,000

The sampling results show that the river in general approaches the objectives of the Commission for a clean stream. There is an increase in pollution east of the mouth of the river. This is due to discharges from sewers in the harbour area.

(3) McVicar Creek

(a) Water Use

At present the creek receives intermittent discharges of process waste from a local brewery. Arrangements have now been made to direct these wastes to the city's sanitary sewers.

The lower portion of the creek has been developed to some extent as a public park.

(b) Sampling Results

Port Arthur- McVicar Creek								
SAMPLE NO.	SAMPLING DATE	DESCRIPTION	5 DAY	SOLIDS (P.P.M.)			PHENOL P.P.M.	TOTAL COLIFORM COUNT IND. NO. 100 C.C.
			B.O.D. P.P.M.	TOTAL	SUSP.	DISS.		
PV 2	SEPT. 9	WARDROPE AVE. AT	1.7	135	0	128	8	100
	SEPT. 15	PT. ARTHUR BOUND	2.0	128	6	122	4	10
	SEPT. 17	ARY	1.2	154	0	146	4	100
PV 1	SEPT. 17	MOUTH OF MCVICAR CREEK	13.0	192	24	168	4	100,000
P 5	SEPT. 8	THUNDER BAY	1.5	104	8	96	8	10,000
	SEPT. 15	500' FROM MOUTH	14.0	68	12	56	4	100,000
	SEPT. 16	OF MCVICAR CR.	2.0	70	20	50	3	1,000,000

The upper section of the creek is in good condition, but the bacterial counts are high near the downstream end. This indicates that sanitary sewage is entering the creek as it passes through the city.

(4) Current River

(a) Water Use

The Current River is utilized by the City of Port Arthur for recreational purposes and as a source of additional electrical power. The flow in the river is controlled by two dams, that is, the Onion Lake dam and the Boulevard Lake dam, which are respectively 10 miles and one-half mile upstream from the mouth.

(b) Sampling Results

Port Arthur- Current River

SAMPLE NO.	SAMPLING DATE	DESCRIPTION	5 DAY	SOLIDS (P.P.M.)			PHENOL PPB	TOTAL COLIFORM COUNT	
			B.O.D. P.P.M.	TOTAL	SUSP.	DISS.		IND. NO.	100 C.C.
SC 3	SEPT. 9	CURRENT R.-PORT	2.1	86	8	78	3	1,000	
	SEPT. 15	ARTHUR BOUNDARY	2.3	68	6	62	---	10	
	SEPT. 17		1.4	68	6	62	---	10	
SB 1	SEPT. 9	E. BRANCH AT	1.5	144	10	134	2	10	
	SEPT. 15	PT. ARTHUR	2.5	124	12	112	---	10	
	SEPT. 17	BOUNDARY	1.1	150	6	144	---	10	
PC 2	SEPT. 9	UPSTREAM OF	1.5	90	12	78	2	100	
	SEPT. 17	BOULEVARD PK.	1.3	68	6	62	---	10	
PC 1	SEPT. 9	UPSTREAM OF	1.2	84	12	72	4	100	
		BOULEVARD PK.							
PB. 1	SEPT. 9	THUNDER BAY	1.4	106	8	98	8	1,000	
	SEPT. 15	MOUTH OF CURRENT	2.6	---	10	---	12	10,000	
	SEPT. 17	RIVER	1.8	83	6	64	7	100,000	

The sampling results indicate that the river is in good condition. Pollution is present at the mouth, but this can be attributed to the unsatisfactory conditions existing in the harbour.

III Pollution Control

At present nearly all sanitary sewage in the city is discharged raw to the harbour area of Thunder Bay. The exception to this is the settling tank located opposite Lillian Street. This serves approximately 1000 homes in the Current River area.

The City of Port Arthur is now installing sewage works which will do much to lessen pollution due to sanitary sewage. This system will not receive the process wastes from the Abitibi Power and Paper Company Limited, the Northern Wood Preservers Limited, or Provincial Pulp and Paper Company Limited.

The two pulp and paper mills could improve their waste discharges by constructing or improving settling lagoons or other forms of solids removal equipment. The Abitibi mill has a settling area which is effective in removing much of the suspended material from the wastes. Continued efforts

in this direction will do much to lessen the amount of wood fibre now discharged to the harbour and Thunder Bay. As discussed in previous reports by the Commission the phenol content of the wastes could be most economically removed by using non-phenolic control agents. At present some of the mills are using such control agents. The problem of B.O.D. reduction is one that will have to receive further investigation.

The Northern Wood Preservers Limited will need to install satisfactory treatment for reducing the phenol, suspended solids, and oil content of their waste. The oil content for the most part will be readily removed in oil-water separators. When this has been accomplished consideration should be given to some form of phenol control.

LAKEHEAD AREA POLLUTION SURVEY

FORT WILLIAM

Lakefront Area

The lakefront area here is used for the same purposes as noted for Port Arthur except that it does not serve as a source for municipal water. Chippewa Park near the south boundary of the city contains a protected swimming area on Lake Superior. In addition, there are a number of summer homes to the south of the park.

There were complaints from commercial fishermen that fish caught in this area could not be sold on the local market. This is due to the fact that the flesh is said to be tainted with oil and other industrial wastes. The Chippewa Park officials reported that there was no problem of beach pollution in that area.

(2) Sampling Results

Fort William - Thunder Bay

SAMPLE NO.	SAMPLING DATE	DESCRIPTION	5 DAY	SOLIDS (P.P.M.)			PHENOL PPB	TOTAL COLI. IND. NO. PER 100 cc
			B.O.D. P.P.M.	TOTAL	SUSP.	DISS.		
FI.1	SEPT. 17	T.B. 500' SOUTH OF ABITIBI MILL AREA.	62.0	262	56	206	4	-
FI.2	SEPT. 17	T.B. 500' SOUTH OF FI.1	10.0	128	32	96	25	-
FI.3	SEPT. 17	T.B. 500' SOUTH OF FI.2	3.6	104	22	82	18	-
FI.3A	SEPT. 17	T.B. 500' SOUTH OF FI.2 (10' DEPTH)	4.4	92	12	80	30	-
FI.4	SEPT. 15	T.B. 500' E. OF FI.1	1.2	-	8	-	70	-

SAMPLE NO.	SAMPLING DATE	DESCRIPTION	- 23 - 5 DAY B.O.D. P.P.M.	SOLIDS (P.P.M.)			PHENOL PPB	TOTAL COLI IND NO. : PER 100 CC
			TOTAL	SUSP.	DISS.			
F1.5	SEPT. 15	T.B. 500' S.E. FROM F1.4	1.8	-	8	-	15	1,000
F1.7	SEPT. 15	T.B. 500' S.E. FROM F1.5	2.8	-	6	-	25	-
FM1.1	SEPT. 9	T.B. UPSTREAM FROM MOUTH OF MISSION R.	19.0	166	28	138	6	1,000
	SEPT. 15		5.7	132	20	112	25	10
	SEPT. 16		4.8	180	20	160	-	10
	SEPT. 17		7.0	-	56	-	18	100
F2.4	SEPT. 18	T.B. 500' N. OF ABITIBI OUTFALL.	85.0	474	168	306	0	1,000
F2.5	SEPT. 18	T.B. 500' N. OF F2.4	36.0	190	40	150	0	-
F3.1	SEPT. 9	T.B. MOUTH OF MCKELLAR R.	5.4	120	22	98	12	1,000
	SEPT. 16		2.0	76	10	66	5	100
F4.1	SEPT. 9	T.B. MOUTH OF KAM RIVER.	1.8	122	14	108	9	10,000
	SEPT. 15		6.8	-	26	-	25	10,000
	SEPT. 16		3.8	110	14	96	7	1,000
F5.1	SEPT. 9	T.B. FT. WILLIAM PT. ARTHUR BOUNDARY.	1.2	80	6	74	10	1,000
	SEPT. 16		1.8	72	12	60	4	10,000

The bacteriological samples indicate that, the pollution at the mouth of the Kam River and opposite the Fort William, Port Arthur boundary, was in excess of the Commission's objective. This pollution can be attributed to sanitary sewage.

The chemical sample results show that there was pollution at the mouths of the three rivers, i.e., Mission, McKellar and Kam. Industrial wastes would be the cause of the high phenol concentrations.

There are two areas of waste discharge for the Abitibi mill, namely, the east side, represented by samples F1.1 to F1.7 inclusive, and the north side represented by samples F2.4 and F2.5. The wastes discharged to the east side create pollution in the immediate area of the outfall, but due to settling in the bark area and dilution, the water at the Mission Gap approaches a satisfactory condition. The wastes discharged to the north side were quite noticeable at the time of sampling. This is substantiated by the sampling results which illustrate a strong waste both on the basis of 5 Day B.O.D. and Suspended Solids. Bottom samples were obtained in the bay to the south of the Abitibi mill. There was no evidence of wood fibre in this area. This can be attributed to the previously noted settling obtained in the bark area.

II Inland Watercourses

(1) Kaministiquia River(Kam River)

(a) Water Use

The Kam River flows through the City of Fort William for a distance of some five miles and empties into Thunder Bay. It is navigable to the west boundary of the city for all lake and most ocean boats. Industries located along the river include; Canadian Iron Foundries Limited, Imperial Oil storage tanks, Ogilvie Flour Mills Limited, several large grain elevators, coal docks and general shipping docks. This section of the river also has docks for small pleasure boats. There are no developed swimming beaches in the area.

There are a number of municipal and private sewers which discharge to the river. It is estimated that approximately one-half of the municipal sanitary sewage is discharged untreated to the watercourse.

(b) Sampling Results

Fort William- Kam River

SAMPLE NO.	SAMPLING DATE	DESCRIPTION	5 DAY	SOLIDS(P.P.M.)			PHENOL PPB	TOTAL COLIFORM COUNT IND. NO. PER 100 C.C.	
			B.O.D. P.P.M.	TOTAL	SUSP.	DISS.			
FK 8	SEPT. 10	KAM R. UPSTREAM	3.8	144	16	128	13	1,000	
	SEPT. 17	G.L. PAPER	2.6	134	20	114	---	10	
	SEPT. 18		2.6	76	10	66	2		
FK 7.1	SEPT. 10	KAM R. 100' DOWNSTREAM FROM G.L. PAPER CO.	65.0	2162	134	2028	---	100	
FK 7.6	SEPT. 10	KAM R. 500' DOWNSTREAM FROM FK 7.1	71.0	356	112	244	0	100	
FK 7.7	SEPT. 10	KAM R. 1000' DOWNSTREAM FROM FK 7.6	64.0	350	76	274	0	1000	
FK 7.7A	SEPT. 18	KAM R. 1 1/2 MI. DOWNSTREAM FROM GT. LAKES PAPER CO. BOTTOM SAMPLE.							

WOOD FIBRE PRESENT

SAMPLE No.	SAMPLING DATE	DESCRIPTION	5 DAY	SOLIDS(P.P.M.)			PHENOL	TOTAL COLIFORM
			B.O.D. P.P.M.	TOTAL	SUSP.	DISS.	PPB.	COUNT IND.No. PER 100 CC.
FK7.7B	SEPT.21	KAM RIVER TURNING BASIN,2000' BELOW GT.LAKES PAPER Co. BOTTOM SAMPLE						
				WOOD FIBRE PRESENT CONTAINING SOME CHEMICAL				
FK6.A	SEPT.10	KAM R.NEAR MUNICIPAL SEWER OUTFALL.	21.0	178	32	146	24	1,000,000
FK 6	SEPT.10	JUNCTION OF KAM RIVER AND MISSION	5.9	178	34	144	14	10,000
	SEPT.15	RIVER.	4.3	78	18	60	18	100
	SEPT.17		30.0	202	34	34	--	10,000
FK 5	SEPT.9	KAM RIVER- UPSTREAM OGILVIE	19.0	156	18	138	4	10,000
	SEPT.15	MILL.	8.0	96	20	76	30	8,000
	SEPT.16		2.8	124	12	112	12	10,000
FK 4.1	SEPT.9	KAM RIVER 100'DOWNSTREAM	215.0	382	166	216	25	100,000
	SEPT.15	FROM OGILVIE OUTFALL.	5.8	82	20	62	15	10,000
	SEPT.16		198.0	386	160	160	10	1,000,000
FK 4.6	SEPT.9	KAM RIVER 500' DOWNSTREAM	21	154	39	120	4	--
	SEPT.15	FROM FK 4.1	12.0	136	20	116	25	--
	SEPT.16		3.8	142	18	124	12	--
FK 4.7	SEPT.9	KAM RIVER 500' DOWNSTREAM	17.0	132	24	108	4	--
	SEPT.15	FROM FK 4.6	8.3	120	30	90	20	1,000
FK 3	SEPT.9	JUNCTION KAM AND MCKELLAR	7.0	170	170	128	9	100,000
	SEPT.15	RIVER	5.2	124	124	108	18	10,000
	SEPT.16		3.0	120	120	112	12	BROKEN
FK 2	SEPT.9	NEAR PROPOSED S.T.P.	4.0	146	28	118	8	1,000,000
	SEPT.16		3.2	122	4	118	12	
F 4.L	SEPT.9	MOUTH OF KAM RIVER	1.8	122	14	108	9	10,000
	SEPT.15		6.8	112	26	86	25	1,000

The bacteriological results indicate that the river upstream of the Fort William western boundary was of satisfactory quality. Samples downstream of the boundary showed considerable pollution. This can be attributed to sanitary sewage.

Sanitary chemical sampling results illustrate that throughout the city the river was in an unsatisfactory condition. Two of the main sources of pollution were Great Lakes Paper Company and the Ogilvie Flour Mill. It was apparent during the survey that other industries were contributing to the pollution of the river such as chaff from the grain elevators.

Bottom samples were obtained at the Turning Basin about 2000 feet downstream from the Great Lakes Paper Company and also about one and one-half miles downstream from the mill. There

was wood fibre in both of these samples and some chemical fibre in the material taken from the Turning Basin.

(2) Neebing River

(a) Water Use and Complaints

The Neebing River flows through Fort William in an easterly direction for some four miles. There are no known industries discharging waste directly to the river in this section. The only use made of this part of the river is by small pleasure boats.

Flooding conditions occur frequently during the spring in this area. As many of the homes are at a low elevation the flow in the storm sewers backs up to house cellars. This presents a public health problem as the river water contains consider quantities of sanitary sewage. There have been frequent complaints in the past concerning this matter.

(b) Sampling Results

Fort William- Neebing River

SAMPLE NO.	SAMPLING DATE	DESCRIPTION	5 DAY	SOLIDS (P.P.M.)			PHENOL PPD	TOTAL COLIFORM COUNT IND. NO. PER 100 CC.
			B.O.D. P.P.M.	TOTAL	SUSP.	DISS.		
NN 5	SEPT. 10	NEAR VICKER'S AVE.	2.3	206	16	190	12	10,000
	SEPT. 15		2.0	172	8	164	--	1,000
	SEPT. 17		1.3	202	10	192	--	100
FN 3	SEPT. 10	NEEBING R. (MAY ST. BRIDGE)	2.6	190	14	176	25	100,000
	SEPT. 15		4.0	160	14	154	--	1,000,000
	SEPT. 17		2.0	168	12	156	--	10,000
FN 2	SEPT. 10	NEEBING R. (DOWNSTREAM FROM FT. WILLIAM S.T.P.)	5.4	214	20	194	25	1,000,000
	SEPT. 15		37.0	246	58	188	--	1,000,000
	SEPT. 17		11.0	210	38	172	--	1,000,000

There is a high degree of pollution by sanitary sewage in this river as indicated by the bacteriological sampling results. This condition prevailed both upstream and downstream of the present sewage treatment plant. The sample Pl.1 could not be obtained close to the mouth of the river due to the shallow water. For this reason it is not considered representative of the degree of contamination in the river.

The sanitary chemical results illustrates that the stream was in its worst condition immediately downstream of the present sewage treatment plant. This is of course due to the overloaded condition which prevails at the plant.

(3) McKellar River

(a) Water Use

The McKellar River is used by both lake and ocean boats. At present there are coal docks and an oil refinery located along its banks. There is no recreational development along this river.

(b) Sampling Results

Fort William- McKellar River

SAMPLE NO.	SAMPLING DATE	DESCRIPTION	5 DAY	SOLIDS (P.P.M.)			PHENOL PPB.	TOTAL COLIFORM COUNT IND. NO. PER 100 CC.
			B.O.D. P.P.M.	TOTAL	SUSP.	DISS.		
FK 3	SEPT. 9	JUNCTION KAM &	7.0	170	42	128	9	100,000
	SEPT. 15	McKELLAR	5.2	124	16	108	18	10,000
	SEPT. 16	RIVER	3.0	120	0	112	12	BROKEN
FM 3	SEPT. 9	UPSTREAM OF	46.0	138	24	114	12	10,000
	SEPT. 16	HUSKY OIL CO.	11.0	128	4	124	18	1,000
FM 2	SEPT. 9	DOWNSTREAM FROM HUSKY OIL CO.	18.0	146	34	112	6	---
	SEPT. 16		4.5	128	12	116	22	10,000
F3.1	SEPT. 9	MOUTH OF	5.4	120	22	98	12	1,000
	SEPT. 16	McKELLAR R.	2.0	76	10	66	5	100

The sampling results show that there was a greater degree of pollution at the upstream end of the river. This can be attributed to the unsatisfactory condition of the Kam River as it enters this river.

(4) Mission River

(a) Water Use

The Mission River is used by lake boats, ocean boats and for log boom transportation. There are docks, warehouses and oil storage tanks located along this watercourse. At present the largest water consumer on the river is the Abitibi Power and Paper Company Limited. In the future large amounts of water will be used by the Ontario Hydro steam generating plant, now under construction. It can be expected that under certain conditions the waste discharges from the paper mill will contaminate the water supply for the Hydro steam plant.

(b) Sampling Results

Fort William- Mission River

SAMPLE NO.	SAMPLING DATE	DESCRIPTION	5 DAY	SOLIDS (P.P.M.)			PHENOL P.P.M.	TOTAL COLIFORM COUNT IND. NO. PER 100 CC.
			B.O.D. P.P.M.	TOTAL	SUSP.	DISS.		
FK 6	SEPT. 10	JUNCTION OF	5.9	178	34	144	14	10,000
	SEPT. 15	KAM AT	4.3	78	18	60	18	100
	SEPT. 17	MISSION R.	30.0	202	34	168	--	10,000
FM 1	SEPT. 9	UPSTREAM	19.0	166	28	138	6	1,000
	SEPT. 15	FROM	5.7	132	20	112	25	10
	SEPT. 16	MOUTH	4.8	188	20	160	--	10
	SEPT. 17	MISSION R.	7.0	--	56	--	18	100
F 2.4	SEPT. 13	500' N. OF ABITIBI OUT-FALL	85.0	474	168	306	0	1,000
F 2.5	SEPT. 18	500' N. OF F 2.4	36.0	190	40	150	0	--

There was a considerable amount of contamination in the river. Since the 5 Day B.O.D. content is high and the bacterial counts low, this pollution can be attributed to industrial waste. As previously discussed most of the industrial waste is from the Abitibi Power and Paper Company Limited.

III Pollution Control

Much of the pollution in Fort William is due to industrial waste. The three main industries in this regard are the Abitibi Power and Paper Company Limited, Mission mill, the Great Lakes Paper Company Limited, and the Ogilvie Flour Mills Limited. The Great Lakes Paper Company is located in Neebing Township at the Fort William- Neebing Township boundary.

The paper companies should consider adequate lagoons or, other suspended solids removal devices for the removal of wood fibre, as a necessary first step in any waste treatment programme. Phenol control where necessary would be most economically realized by substituting other materials as slime control agents. The adequate reduction of B.O.D. is a problem which should receive further study.

Waste treatment at the Ogilvie Flour Mills should be designed to reduce both the B.O.D. and the suspended solids. Since a previous survey by the Commission indicated that the B.O.D. content of this waste was excessively high, consideration should be given to treatment which would produce a satisfactory effluent or if this is not possible then complete elimination would be necessary.

LAKEHEAD AREA POLLUTION SURVEY

MUNICIPALITY OF NEEBING

I Inland Watercourses

(1) Kaministiquia River(Kam River)

(a) Water Use and Complaints

The rapids at Point de Meuron restricts its use for boats. These rapids are located some two and one-half miles upstream from the east boundary of the township. Log boom boats navigate the downstream section up to the Great Lakes Paper Company. It is used for recreational purposes such as boating, fishing, swimming, park sites, summer cottage location and landing bases for small float equipped aircraft.

There were no reported complaints concerning pollution in this part of the watercourse with the exception of the area near the Great Lakes Paper Company.

(b) Sampling Results

Neebing Twp.- Kam River

SAMPLE NO.	SAMPLING DATE	DESCRIPTION	5 DAY	SOLIDS(P.P.M.)			PHENOL PPD	TOTAL COLIFORM COUNT IND. NO. PER 100 CC.
			B.O.D. P.P.M.	TOTAL	SUSP.	DISS.		
NK 3	SEPT. 10	KAM RIVER	3.0	134	18	116	--	100
	SEPT. 15	NEAR W.	3.0	88	10	78	--	10
	SEPT. 17	BOUNDARY OF	2.4	100	12	88	--	100
	NOV. 13	NEEBING					TRACE	
	NOV. 16	TWP.					3	
FK 8	SEPT. 10	KAM RIVER	3.8	144	16	128	13	1,000
	SEPT. 17	UPSTREAM	2.6	134	20	114	--	--
	SEPT. 18	G.L. PAPER CO.	2.6	76	10	66	2	10

On the basis of the bacteriological sampling results the stream was in a satisfactory condition.

The sanitary chemical sample results are all within the objectives of the OWRC with the exception of phenol. The small amount of phenol noted at sampling point NK 8 is likely due to natural causes, as the only industry upstream of this point is the brick yard at Rosslyn. It is not likely that this operation would produce a phenolic waste. The high phenol content in sample FK 8 on September 10th is likely due to waste from the Great Lakes Paper Company Limited.

Considerable pollution is produced in the river by wastes from the Great Lakes Paper Company. These affect the river downstream in Fort William and are discussed under that municipality.

(2) Neebing River _ _ _

(a) Water Use and Complaints

The flow in the Neebing River is quite variable, with a recorded maximum of 1460 cubic feet per second and a low of zero. It has no commercial use in this section and limited recreational use for private fishing. The only complaint of pollution to the river concerned the operation of private waste disposal areas on the flood plain. At the time of the survey adequate steps had been taken to prevent pollution from this source.

(b) Sampling Results

Neebing Twp.- Neebing River

SAMPLE No.	SAMPLING DATE	DESCRIPTION	5 DAY	SOLIDS(P.P.M.)			PHENOL PPB.	TOTAL COLIFORM COUNT IND. NO. PER 100 CC.
			B.O.D. P.P.M.	TOTAL	SUSP.	DISS.		
NN 6	SEPT. 10	NEEBING TWP.	1.9	210	6	204	15	100
	SEPT. 15	WEST BOUND-	1.9	204	10	199	--	10
	SEPT. 17	ARY	4.0	228	8	220	--	100
SN 6	SEPT. 10	N. BRANCH	1.6	174	8	166	30	1,000
	SEPT. 15	AT ARTHUR	1.6	136	8	128	--	1,000
	SEPT. 17	ST.	1.5	192	6	186	--	100
NN 5	SEPT. 10	NEAR VICKERS	2.3	206	16	190	12	10,000
	SEPT. 15	AVE.	2.0	172	8	164	--	1,000
	SEPT. 17		1.3	202	10	192	--	100

The bacteriological sample results were all satisfactory with the exception of one obtained at sampling point NN 5 near Vickers Avenue. In view of the fact that only one of the three samples exceeded the Commission objective, more sampling at this point will be necessary in order to determine the extent of pollution.

With the exception of the high phenol content the sanitary chemical sample results were satisfactory. It is difficult to explain the high phenol content of samples in this area. More samples will have to be obtained and a further investigation made of this area.

II Pollution Control

The pollution in Neebing Township except for Great Lakes Paper Company is limited. It can be expected that this will increase with future industrial and residential development unless an adequate sewerage plan is now prepared for the area. This should envisage a co-operative sewerage development with the City of Fort William.

LAKEHEAD AREA POLLUTION SURVEY

MUNICIPALITY OF SHUNIAH

I Lakefront Area

(1) Water Use and Complaints

The lakefront area here is developed mostly for summer homes. Complaints have been received from the persons in this section concerning the deposition of wood fibre on the beaches.

(2) Sampling Results

Shuniah- Thunder Bay

SAMPLE No.	SAMPLING DATE	DESCRIPTION	5 DAY	SOLIDS (P.C.P.M.)			PHENOL PPB	TOTAL COLIFORM COUNT IND. No. PER 100 CC.
			B.O.D. P.C.P.M.	TOTAL	SUSP.	DISS.		
TB 1	SEPT. 15	FLORAL BEACH 1 MILE N. OF PT. ARTHUR WATER INTAKE	0.8	--	6	--	20	10

The surface sample obtained opposite Floral Beach indicated that the water met the objectives of the Commission with the exception of the phenol content, which was 20 ppb.

There was no wood fibre present in a bottom sample from this area. Both the surface and the bottom samples were taken at 1,000 feet from shore.

Samples obtained from the water and beach at Silver Bay contained wood fibre, but no chemical fibre. It could not be established whether the material was ground wood from

mill operations or fibre from log boom operations in the area.

II Inland Watercourses

(1) McIntyre River

(a) Water Use

The flow in the McIntyre River is quite low during part of the year. There is no commercial or industrial use made of this part of the river.

(b) Sampling Results

Shuniah- McIntyre River

SAMPLE NO.	SAMPLING DATE	DESCRIPTION	5 DAY	SOLIDS (P.P.M.)			PHENOL PPB ₂	TOTAL COLIFORM COUNT IND. NO. PER 100 CC.
			B.O.D. P.P.M.	TOTAL	SUSP.	DISS.		
SM 6	SEPT. 9	NEAR JOHN STREET	3.2	146	16	130	2	1,000
	SEPT. 15		2.2	120	4	116	-	109
SM 5	SEPT. 9	NEAR PT.	1.9	148	8	140	6	1,000
	SEPT. 15	ARTHUR	2.2	100	12	88	-	100
	SEPT. 17	BOUNDARY	1.6	112	10	102	-	1,000
SM 4	SEPT. 9	ELEVENTH	2.0	132	10	122	2	10,000
	SEPT. 15	AVENUE	1.7	126	8	118	-	1,000
	SEPT. 17	BRIDGE	1.8	130	12	118	-	100,000
PM 2	SEPT. 9	MAY STREET	3.6	146	8	138	2	1,000
	SEPT. 15	BRIDGE	2.4	138	10	128	-	1,000

The upper portion of the river was in a satisfactory condition from a pollution standard. Samples obtained near Golf Links Road show that this section of the river was contaminated with sanitary sewage.

(2) McVicar Creek

(a) Water Use

There is only a short section of McVicar Creek flowing through Shuniah. The flow here is low and there is only limited residential development in the area.

The following results indicate that the condition of

this watercourse in Shuniah is satisfactory.

(b) Sampling Results

Shuniah- McVicar Creek

SAMPLE NO.	SAMPLING DATE	DESCRIPTION	5 DAY	SOLIDS (P.P.M.)			PHENOL PPB	TOTAL COLIFORM COUNT IND. NO. PER 100 CC.
			B.O.D. P.P.M.	TOTAL	SUSP.	DISS.		
PV 2	SEPT. 9	WARDROPE AVE.	1.7	136	8	128	8	100
	SEPT. 15	AT PT. ARTHUR	2.0	128	6	122	-	10
	SEPT. 17	BOUNDARY	1.2	154	8	146	-	100

(3) Current River

(a) Water Use

There is no significant house developments in this area of the Current River. No commercial or industrial use is made of this part of the river.

(b) Sampling Results

Shuniah- Current River

SAMPLE NO.	SAMPLING DATE	DESCRIPTION	5 DAY	SOLIDS (P.P.M.)			PHENOL PPB	TOTAL COLIFORM COUNT IND. NO. PER 100 CC.
			B.O.D. P.P.M.	TOTAL	SUSP.	DISS.		
SC 3	SEPT. 9	CURRENT RIVER-	2.1	86	8	78	3	1,000
	SEPT. 15	PORT ARTHUR	2.3	68	6	62	-	10
	SEPT. 17	BOUNDARY	1.4	63	6	62	-	10
SB 1	SEPT. 9	E. BRANCH AT	1.5	144	10	134	2	10
	SEPT. 15	PT. ARTHUR	2.5	124	12	112	-	10
	SEPT. 17	BOUNDARY	1.1	150	6	144	-	10

The Current River and its southern branch was in a satisfactory condition as it flows through the Municipality of Shuniah.

III Pollution Control

Future industrial and residential development of this area, if not adequately planned will create extensive pollution problems. For this reason an adequate sewerage plan

should now be prepared for the area. The most efficient plan will be based on a joint scheme with the cities of Port Arthur and Fort William.

The only industrial pollution in Shuniah is due to wood fibre which occurs along the lakefront, and the presence of phenol. Much of this wood fibre is due to log boom operations in the area, and the resulting pollution is difficult to control. The phenol and other wood fibre waste are caused by industries outside the municipality.

The presence of sanitary sewage in the McIntyre River near the Golf Links Road is likely due to, the lack of, or improperly constructed, private sewage disposal systems. Present installations are adequately controlled by the local health unit, and the problem is possibly due to older installations. In any case the situation should be corrected by the local authorities.

LAKEHEAD AREA POLLUTION SURVEY

THUNDER BAY EXCLUSIVE OF HARBOUR AREA

I Water Use and Complaints

Thunder Bay outside the harbour area is used for shipping, transporting of log booms, commercial and private fishing, and for boating. Its outlets to Lake Superior are approximately 13 miles south-east of the lakehead.

It was reported that wood fibre was deposited on the beach at the Sleeping Giant. The Sleeping Giant is a point of land which forms part of the east boundary of the bay and is approximately 15 miles east of Port Arthur and Fort William.

II Sampling Results

Thunder Bay								
SAMPLE NO.	SAMPLING DATE	DESCRIPTION	5 DAY	SOLIDS (P.P.M.)			PHENOL	TOTAL COLI. IND. NO. PER 100 cc
			B.O.D. P.P.M.	TOTAL	SUSP.	DISS.	P.P.B.	
TB 6	SEPT. 17	MISSION R. GAP.	4.8	-	16	-	4	100
TB 7	SEPT. 16	SOUTH GAP.	1.9	70	16	62	4	10,000
TB 8	SEPT. 15	MAIN GAP.	1.3	-	8	0	0	100
	SEPT. 17		2.2	72	6	66	-	100
TB 9	SEPT. 8	NORTH GAP.	BOTTOM SAMPLE CONTAINED WOOD FIBRE.					100
	SEPT. 9		1.5	75	8	68	8	10,000
	SEPT. 15		1.4	-	14	-	10	
TB 1	SEPT. 15	FLORAL BEACH 1 MILE N. OF PT. ARTHUR WATER INTAKE.	0.8	-	6	-	20	10
TB 3	SEPT. 17	1 MILE N.W. OF HARE ISLAND.	1.2	TURBIDITY IN SILICA UNITS- 0 1.9				0
TB.4	SEPT. 17	NORTH END OF PIE ISLAND.	0.7		3.2		2	0

SAMPLE NO.	SAMPLING DATE	DESCRIPTION	5 DAY	SOLIDS (P.P.M.)			PHENOL P.P.B.	TOTAL COLI. IND. NO. PER 100 cc
			B.O.D. P.P.M.	TOTAL	SUSP.	DISS.		
TB. 5	SEPT. 17	SOUTH END OF PIE ISLAND	0.9	TURBIDITY IN SILICA UNITS = 2.7			0	10
TB. 2	SEPT. 17	WHISKEY JACK POINT 1500' FROM SHORE	0.9		3.2		2	100

Four samples were obtained at various points near the outlets of Thunder Bay. These are indicated on Map #2. The sampling results indicate that pollution discharged from the lakehead area was diluted satisfactorily in Thunder Bay before reaching Lake Superior.

The beach at the Sleeping Giant could not be reached at the time of the survey. An examination was made of the beach on Hare Island which is one and one-half miles west of the Sleeping Giant. It was noted that there was a considerable amount of bark on the shore, but no wood fibre. The bark would most likely be from log boom operations.

LAKEHEAD POLLUTION SAMPLE ANALYSES

FIGURE 1.

SAMPLE NO.	LAB. NO.	SAMPLING DATE	DESCRIPTION	THUNDER BAY				PHENOL PPB.	TOTAL COLI. IND. NO. PER 100 CC.	ETHER SOLUBLE 320
				5 DAY B.O.D. P.P.M.	SOLIDS TOTAL	(P.P.M.) SUSP. DISS.				
PORT ARTHUR- THUNDER BAY (T.B.)										
P.1.1	R1584	SEPT. 9	THUNDER BAY - MOUTH	2.2	92	10	82	8	1,000	
	R1739	SEPT. 16	OF NEEBING RIVER	1.1	70	8	62	8	100	
	R1682	SEPT. 15		1.5	70	12	58	10	10,000	
P2.1	R1579	SEPT. 9	THUNDER BAY - 500' FROM	2.8	100	8	92	22	1,000,000	
	R1680	SEPT. 15	MOUTH OF MCINTYRE R.	1.3	62	6	56	6	1,000	
	R1737	SEPT. 16		1.6	-	-	-	4	10,000	
P3.1	R1574	SEPT. 9	T.B. - 100' FROM OUTFALL	74.0	152	28	124	500	-	
	R1898	SEPT. 15	NORTHERN WOOD PRESERVERS	1.7	-	6	-	4	-	
	R1751	SEPT. 16		1.7	92	20	72	5	1,000	
P3.2	R1572	SEPT. 9	T.B. - 500' SOUTH P3.1	1.2	84	20	64	9	-	
	R1696	SEPT. 15		8.8	-	10	-	20	-	
	R1735	SEPT. 16		1.6	-	14	-	4	-	
P3.3	R1577	SEPT. 9	T.B. - 500' S. OF P3.2	1.6	74	8	66	9	-	
	R1681	SEPT. 15		1.6	-	10	-	4	-	
	R1736	SEPT. 16		3.0	-	20	-	4	-	
P3.4	R1575	SEPT. 9	T.B. - 500' E. OF P3.1	3.0	72	8	64	9	-	
	R1695	SEPT. 15		2.0	-	10	-	5	-	
	R1752	SEPT. 16		1.6	78	16	62	4	-	
P3.5	R1576	SEPT. 9	T.B. - 500' E. OF P3.4	1.9	80	4	76	10	-	
	R1697	SEPT. 15		2.1	-	8	-	3	-	
	R1734	SEPT. 16		1.2	-	14	-	5	-	
P3.6	R1573	SEPT. 9	T.B. - 500' N. OF P3.1	5.2	82	28	54	22	-	
	R1699	SEPT. 16		1.6	-	10	-	3	-	
	R1750	SEPT. 16		1.6	86	18	68	3	-	
P3.7	R1578	SEPT. 9	T.B. - 500' N. OF P3.6	1.9	70	12	58	25	10,000	
	R1694	SEPT. 15		1.4	-	4	-	-	-	
	R1749	SEPT. 16		1.4	84	18	66	3	1,000	
P.4	R1580	SEPT. 9	T.B. - 500' FROM WILSON	1.6	76	10	66	12	10,000	
	R1693	SEPT. 15	ST. SEWER OUTFALL	1.8	-	8	-	-	1,000	
	R1748	SEPT. 16		1.6	96	16	80	3	10,000	
P.5	R1581	SEPT. 9	T.B. - 500' FROM RIVER ST.	2.1	76	8	68	15	1,000	
	R1688	SEPT. 15	SEWER OUTFALL	1.7	-	6	-	6	10,000	
	R1754	SEPT. 16		1.1	76	16	60	4	1,000	
P.6	R1600	SEPT. 9	T.B. MOUTH OF	1.5	104	8	96	8	10,000	
	R1760	SEPT. 15	MCVICAR CRES.	14.0	-	12	-	4	100,000	
	R1745	SEPT. 16		2.0	-	20	-	3	1,000,000	
P.7	R1599	SEPT. 9	T.B. - 500' FROM CLARKE	2.4	82	8	74	12	1,000	
	R1689	SEPT. 15	ST. SEWER OUTFALL	2.2	-	12	-	8	10,000	
	R1755	SEPT. 16		1.3	78	14	64	40	1,000	
P.8	R1602	SEPT. 9	T.B. - 500' FROM MOUTH	1.4	106	8	98	8	1,000	
	R1687	SEPT. 15	OF CURRENT RIVER,	2.6	-	10	-	10	100,000	
	R1756	SEPT. 16		1.8	80	16	64	7	10,000	
P 9.1	R1596	SEPT. 9	T.B. - 100' FROM PROVINCIAL MILL OUTFALL	68.0	446	258	188	12	100,000	
P 9.2	R1598	SEPT. 9	T.B. - 500' S. OF P9.1	44.0	372	212	160	10	1,000	
	R1691	SEPT. 15		2.6	-	6	-	10		

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THUNDER BAY

SAMPLE NO.	LAB. NO.	SAMPLING DATE	DESCRIPTION	5 DAY	SOLIDS (P.P.M.)			PHENOL PPB	TOTAL COLI. IND. NO. PER 100 CC.
				B.O.D. PPM	TOTAL	SUSP.	DISS.		
P 9.3	R1597	SEPT. 9	T.B. 500' S. OF P9.2	20.0	108	18	90	25	10,000
	R1690	SEPT. 15		1.8	-	12	-	10	-
	R1787	SEPT. 16		7.5	98	28	70	30	10,000
P 9.4	R1685	SEPT. 15	T.B. 500' E. OF P9.1	8.6	-	22	-	15	-
	R1785	SEPT. 16		76.0	300	38	262	-	-
P 9.5	R1686	SEPT. 15	T.B. 500' E. OF P9.2	264.0	1126	50	1076	-	10,000
	R1759	SEPT. 16		6.2	134	34	110	30	-
P 9.5A		SEPT. 9	T.B. 500' E. OF P9.5 BOTTOM SAMPLE.		CONTAINED WOOD FIBRE				
	R1692	SEPT. 15	T.B. 500' E. OF P9.5	6.5	76	10	66	25	-
	R1762	SEPT. 16		6.9	126	26	100	25	-
P11.1			T.B. 100' FROM ABITIBI MILL OUTFALL.		NOT OBTAINED.				
P11.2	R1760	SEPT. 16	T.B. 500' S. OF ABITIBI MILL OUTFALL	0.9	88	8	80	3	-
P11.3	R1704	SEPT. 15	T.B. 500' S. OF P11.2	1.1	-	12	-	7	-
	R1761	SEPT. 16		1.0	74	4	70	3	-
		SEPT. 15	BOTTOM SAMPLE		BARK PRESENT.				
P11.4	R1705	SEPT. 15	T.B. 500' E. OF P11.1	26.0	156	16	140	700	1,000
	R1765	SEPT. 16		52.0	274	26	248	-	-
					CHEMICAL FIBRE PRESENT.				
P11.5	R1706	SEPT. 15	T.B. 500' E. OF P11.4	1.1	-	12	-	5	-
	R1764	SEPT. 16		1.2	70	10	60	3	100
P11.5A	R1763	SEPT. 16	T.B. 1/2 MILE 25' DEPTH FROM ABITIBI OUTFALL	2.4	78	16	62	15	-
		SEPT. 16	BOTTOM SAMPLE		WOOD FIBRE PRESENT.				
P11.6	R1742	SEPT. 16	T.B. 500' NORTH OF P11.1	.9	-	4	-	3	-
P11.7	R1707	SEPT. 15	T.B. 500' NORTH OF P11.6	1.7	-	14	-	4	-
		SEPT. 15	BOTTOM SAMPLE.		WOOD FIBRE PRESENT.				
	R1743	SEPT. 16	T.B. 500' NORTH OF P11.6	1.5	-	4	-	3	-
P 12	R1744	SEPT. 16	T.B. CITY WATER INTAKE	2.2	-	4	-	2	100
P 12A	R1702	SEPT. 15	T.B. 30' DEPTH AT CITY WATER INTAKE	1.2	-	6	-	-	-
	R1744	SEPT. 16	T.B. 25' DEPTH AT CITY WATER INTAKE	1.6	-	16	-	2	-
					WOOD FIBRE PRESENT.				
P 12B	R1763	SEPT. 15	T.B. CITY WATER INTAKE AT BOTTOM, 50' DEPTH.	8.4	-	122	-	6	-
					WOOD FIBRE PRESENT.				

FORT WILLIAM - THUNDER BAY

F 1.1	R1803	SEPT. 17	T.B. 500' S. OF ABITIBI MILL AREA.	62.0	262	56	206	4	-
F1.2	R1805	SEPT. 17	T.B. 500' S. OF F 1.1	10.0	128	32	96	25	-
F 1.3	R1804	SEPT. 17	T.B. 500' S. OF F 1.2	3.6	104	22	82	18	-
F 1.3A	R1806	SEPT. 17	T.B. DO. (10' DEPTH)	4.4	92	12	80	30	-
F 1.4	R1712	SEPT. 15	T.B. 500' E. OF F 1.1	1.2	-	8	-	70	-
F 1.5	R1714	SEPT. 15	T.B. 500' S. E. FROM F1.4	1.8	-	8	-	15	1,000
F 1.7	R1711	SEPT. 15	T.B. 500' S. E. FROM F1.5	2.8	-	6	-	25	-

FORT WILLIAM - THUNDER BAY

SAMPLE NO.	LAB. NO.	SAMPLING DATE	DESCRIPTION	5 DAY	SOLIDS (P.P.M.)			PHENOL P.P.B.	TOTAL COLI. IND. NO. PER 100 CC.
				B.O.D. P.P.M.	TOTAL	SUSP.	DISS.		
FMI.1	R1592	SEPT. 9	T.B. UPSTREAM FROM MOUTH OF	19.0	166	28	138	6	1,000
	R1709	SEPT. 15	MISSION RIVER	5.7	132	20	112	25	10
	R1784	SEPT. 16		4.8	180	20	160	-	10
	R1795	SEPT. 17		7.0	-	56	-	18	100
F 2.4	R1800	SEPT. 18	T.B. 500' N. OF ABITIBI OUTFALL.	85.0	474	168	306	-	1,000
F 2.5	R1802	SEPT. 18	T.B. 500' N. OF F 2.4	36.0	190	40	150	-	-
F 3.1	R1588	SEPT. 9	T.B. MOUTH OF MCKELLAR R.	5.4	120	22	98	12	1,000
	R1768	SEPT. 16		2.0	76	10	66	5	100
F 4.1	R1582	SEPT. 9	T.B. MOUTH OF KAM R.	1.8	122	14	108	9	10,000
	R1683	SEPT. 15		6.8	-	26	-	25	10,000
	R1741	SEPT. 16		3.8	110	14	96	7	1,000
F 5.1	R1586	SEPT. 9	T.B. - FT. WILLIAM - PT.	1.2	80	6	74	10	1,000
	R1740	SEPT. 16	ARTHUR BOUNDARY	1.8	72	12	60	4	10,000

THUNDER BAY

TB 6	R1807	SEPT. 17	MISSION R. GAP	4.8	-	16	-	4	100
TB 7	R1753	SEPT. 16	SOUTH GAP	1.9	78	16	62	4	10,000
TB 8	R1713	SEPT. 15	MAIN GAP	1.3	-	8	-	-	100
	R1783	SEPT. 17		2.2	72	6	66	-	100
TB 9		SEPT. 8	NORTH GAP, BOTTOM SAMPLE	CONTAINED WOOD FIBRE SOME CHEMICAL FIBRE.					
	R1601	SEPT. 9		1.5	76	8	68	8	100
	R1708	SEPT. 15		1.4	-	14	-	10	10,000
TB 1	R1701	SEPT. 15	FLORAL BEACH 1 MILE N. OF PT. ARTHUR WATER INTAKE	0.8	-	6	-	20	10
TURBIDITY IN SILICA UNITS									
TB 3	R1796	SEPT. 17	ONE MILE N.W. OF HARE ISLAND.	1.2		1.9		-	-
TB 4	R1797	SEPT. 17	NORTH END OF PIE ISLAND.	0.7		3.2		2	-
TB 5	R1798	SEPT. 17	SOUTH END OF PIE ISLAND.	0.9		2.7		-	10
TB 2	R1799	SEPT. 17	WHISKEY JACK PT. 1500' FROM SHORE.	0.9		3.2		2	100

INLAND WATERCOURSES - FIGURE 2

NEEBING TWP. - KAM RIVER									
NK 8	R1617	SEPT. 10	KAM R. NEAR W. BOUNDARY	3.0	134	18	116	-	100
	R1664	SEPT. 15	OF NEEBING TWP.	3.0	88	10	78	-	10
	R1785	SEPT. 17		2.4	100	12	88	-	100
	R2332	NOV. 13						TRACE	
	R2333	NOV. 16						3	
FK 8	R1620	SEPT. 10	KAM R. UPSTREAM G.L. PAPER.	3.8	144	16	128	13	1,000
	R1777	SEPT. 17		2.6	134	20	114	-	-
	R1801	SEPT. 18		2.6	76	10	66	2	10

FORT WILLIAM - KAM RIVER

FK 7.1	R1623	SEPT. 10	KAM R. 100' DOWNSTREAM FROM GREAT LAKES PAPER CO.	658.0	2162	134	2028	-	100
FK 7.6	R1622	SEPT. 10	KAM R. 500' DOWNSTREAM FROM FK7.1	71.0	356	112	244	-	100

FORT WILLIAM - KAM RIVER

SAMPLE NO.	LAB. NO.	SAMPLING DATE	DESCRIPTION	5 DAY	SOLIDS (P.P.M)			PHENOL PPB	TOTAL COLI. IND. NO. PER 100cc
				B.O.D. PPM	TOTAL	SUSP.	DISS.		
FK 7.7	R1621	SEPT. 10	KAM R. 1000' DOWNSTREAM FROM FK 7.6	64.0	350	76	274	-	1,000
BOTTOM SAMPLE		SEPT. 18	KAM R. 1 1/2 MILES DOWNSTREAM FROM GT. LAKES PAPER CO.	WOOD FIBRE PRESENT.					
BOTTOM SAMPLE		SEPT. 21	KAM R. TURNING BASIN, 2000' BELOW GT. LAKES PAPER CO.	WOOD FIBRE PRESENT CONTAINING SOME CHEMICAL FIBRE.					
FK 6A	R1619	SEPT. 10	KAM R. - NEAR MUNICIPAL SEWER OUTFALL	21.0	178	32	146	24	1,000,000
FK 6	R1618	SEPT. 10	JUNCTION OF KAM & MISSION	5.9	178	34	144	14	10,000
	R1715	SEPT. 15		4.3	78	18	60	18	100
	R1792	SEPT. 17		30.0	202	34	168	-	10,000
FK 5	R1595	SEPT. 9	KAM R. - UPSTREAM OGILVIE MILL.	19.0	156	18	138	4	10,000
	R1710	SEPT. 15		8.0	96	20	76	30	1,000
	R1767	SEPT. 16		2.8	124	12	112	12	10,000
FK 4.1	R1594	SEPT. 9	KAM R. - 100' DOWNSTREAM FROM OGILVIE OUTFALL.	215.0	382	166	216	25	100,000
	R1716	SEPT. 15		5.8	82	20	62	15	10,000
	R1766	SEPT. 16		198.9	386	160	226	10	1,000,000
FK 4.6	R1591	SEPT. 9	KAM R. - 500' DOWNSTREAM FROM FK 4.1	21	154	39	120	4	-
	R1769	SEPT. 16		3.8	142	18	124	12	-
	R1677	SEPT. 15		12.0	136	20	116	25	-
FK 4.7	R1590	SEPT. 9	KAM R. - 500' DOWNSTREAM FROM FK 4.6	17.0	132	24	108	4	-
	R1584	SEPT. 15		8.3	120	30	90	20	1,000
FK 3	R1587	SEPT. 9	JUNCTION KAM & MCKELLAR R.	7.0	170	42	128	9	100,000
	R1678	SEPT. 15		5.2	124	16	108	18	10,000
	R1772	SEPT. 16		3.0	120	8	112	12	BROKEN.
FK 2	R1583	SEPT. 9	NEAR PROPOSED S.T.C.P. AREA.	4.0	146	28	118	8	1,000,000
	R1772	SEPT. 16		3.2	122	4	118	12	1,000
F 4.1	R1582	SEPT. 9	MOUTH OF KAM R.	1.8	122	14	108	9	10,000
	R1683	SEPT. 15		6.8	112	26	86	25	1,000

INLAND WATERCOURSES

FORT WILLIAM - MCKELLAR RIVER

FM 3	R1589	SEPT. 9	UPSTREAM OF HUSKY OIL CO.	46.0	138	24	114	12	10,000
	R1771	SEPT. 16		11.0	128	4	124	18	1,000
FM 2	R1593	SEPT. 9	DOWNSTREAM FROM HUSKY OIL CO.	18.0	146	34	112	6	-
	R1770	SEPT. 16		4.5	128	12	116	22	10,000
F3.1	R1588	SEPT. 9	MOUTH OF MCKELLAR RIVER.	5.4	120	22	98	12	1,000
	R1768	SEPT. 16		2.0	76	10	66	5	100

FORT WILLIAM - MISSION RIVER

FM 1.1	R1592	SEPT. 9	UPSTREAM FROM MOUTH MISSION RIVER	19.0	166	28	138	6	1,000
	R1709	SEPT. 15		5.7	132	20	112	25	10
	R1784	SEPT. 16		4.8	180	20	160	-	10
	R1795	SEPT. 17		7.0	-	56	-	18	100
F 2.4	R1800	SEPT. 18	500' N. OF ABITIBI OUTFALL.	85.0	474	160	306	-	1,000
F 2.5	R1802	SEPT. 18	500' N. OF F2.4	36.0	190	40	150	-	-

NEEBING TWP. - NEEBING RIVER

SAMPLE NO.	LAB NO.	SAMPLING DATE	DESCRIPTION	5 DAY B.O.D. P.P.M.		SOLIDS (P.P.M) TOTAL SUSP. DISS.			PHENOL PPB.	TOTAL COLI. IND. NO. PER 100 CC
NN 6	R1616	SEPT. 10	NEEBING TWP. W. BOUNDARY	1.9	210	6	204	15	-	100
	R1663	SEPT. 15		1.9	204	10	199	-	-	10
	R1786	SEPT. 17		4.0	228	8	220	-	-	100
SN 6	R1612	SEPT. 10	N. BRANCH AT ARTHUR ST.	1.6	174	8	166	30	-	1,000
	R1665	SEPT. 15		1.6	136	8	128	-	-	1,000
	R1787	SEPT. 17		1.5	192	6	186	-	-	100
NN 5	R1615	SEPT. 10	NEAR VICKERS AVE.	2.3	206	16	190	12	-	10,000
	R1666	SEPT. 15		2.0	172	8	164	-	-	1,000
	R1788	SEPT. 17		1.3	202	10	192	-	-	100

FORT WILLIAM - NEEBING RIVER

FN 3	R1613	SEPT. 10	NEEBING R. (MAY ST. BRIDGE)	2.6	190	14	176	25	-	100,000
	R1672	SEPT. 15		4.0	168	14	154	-	-	1,000,000
	R1791	SEPT. 17		2.0	168	12	156	-	-	10,000
FN 2	R1614	SEPT. 10	NEEBING R. (DOWNSTREAM FROM FT. WILLIAM S.T.P.)	5.4	214	20	194	25	-	1,000,000
	R1668	SEPT. 15		37.0	246	58	188	-	-	1,000,000
	R1790	SEPT. 17		11.0	210	38	172	-	-	1,000,000

PORT ARTHUR - NEEBING RIVER

PI.1	R1584	SEPT. 9	THUNDER BAY - MOUTH OF NEEBING RIVER.	2.2	92	10	82	8	-	1,000
	R1739	SEPT. 16		1.1	70	8	62	8	-	100
	R1682	SEPT. 16		1.5	70	12	58	10	-	10,000

SHUNIAH - MCINTYRE RIVER

SM 6	R1605	SEPT. 9	NEAR JOHN ST.	3.2	146	16	130	2	-	1,000
	R1673	SEPT. 15		2.2	120	4	116	-	-	100
SM 5	R1606	SEPT. 9	NEAR PORT ARTHUR BOUNDARY	1.9	148	8	140	6	-	1,000
	R1669	SEPT. 15		2.2	100	12	88	-	-	100
	R1779	SEPT. 17		1.6	112	10	102	-	-	1,000
SM 4	R1604	SEPT. 9	ELEVENTH AVE. BRIDGE.	2.0	132	10	122	2	-	10,000
	R1670	SEPT. 15		1.7	126	8	118	-	-	1,000
	R1778	SEPT. 17		1.8	130	12	118	-	-	100,000
PM 2	R1607	SEPT. 9	MAY ST. BRIDGE	3.6	146	8	138	2	-	1,000
	R1671	SEPT. 15		2.4	138	10	128	-	-	1,000

PORT ARTHUR - MCINTYRE RIVER

PM.1.A	R1667	SEPT. 15	MAY ST. BRIDGE DOWNSTREAM FROM NEW PORT ARTHUR S.T.P.	2.6	112	10	102	-	-	10,000
PM 1	R1585	SEPT. 9	MOUTH OF MCINTYRE RIVER	3.1	148	22	126	10	-	1,000
	R1738	SEPT. 16		1.6	100	12	88	4	-	1,000
P2.1	R1579	SEPT. 9	THUNDER BAY - 500' E. OF MOUTH OF MCINTYRE R.	2.8	100	8	92	22	-	100,000
	R1680	SEPT. 15		1.3	62	6	56	6	-	1,000
	R1737	SEPT. 16		1.6	-	-	-	4	-	10,000

SHUNIAH - MCVICAR CREEK.

PV 2	R1611	SEPT. 9	WARDROPE AVE. AT PT. ARTHUR BOUNDARY	1.7	136	8	128	8	-	100
	R1674	SEPT. 15		2.0	128	6	122	-	-	10
	R1782	SEPT. 17		1.2	154	8	146	-	-	100
PV 1	R1793	SEPT. 17	MOUTH OF MCVICAR CREEK.	13.0	192	24	168	-	-	100,000

PORT ARTHUR - McVICAR CREEK

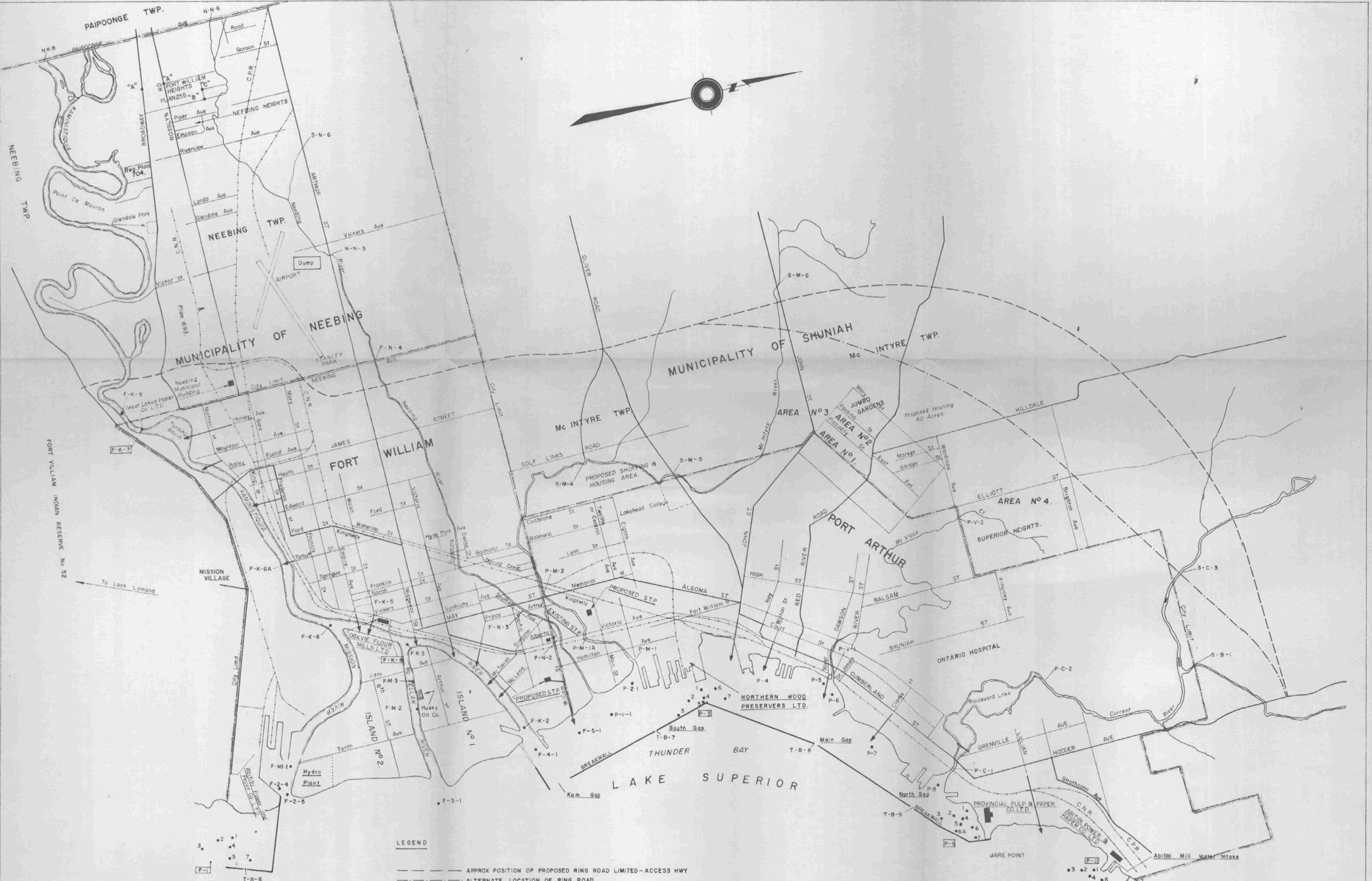
SAMPLE NO.	LAB. NO.	SAMPLING DATE	DESCRIPTION	5 DAY	SOLIDS (P.P.M.)			PHENOL P.P.B.	TOTAL COLI. IND. NO. PER 100 CC.
				B.O.D. P.P.M.	TOTAL	SUSP.	DISS.		
P 6	R1600	SEPT. 8	THUNDER BAY - 500' FROM MOUTH	1.5	104	8	96	.8	10,000
	R1700	SEPT. 15	OF McVICAR CR.	14.0	68	12	56	4	100,000
	R1745	SEPT. 16		2.0	70	20	50	3	1,000,000

SHUNIAH CURRENT RIVER

SC 3	R1608	SEPT. 9	CURRENT R. - PORT ARTHUR	2.1	86	8	78	3	1,000
	R1675	SEPT. 15	BOUNDARY.	2.3	68	6	62	-	10
	R1781	SEPT. 17		1.4	68	6	62	-	10
SB 1	R1609	SEPT. 9	E. BRANCH AT PT. ARTHUR	1.5	144	10	134	2	10
	R1676	SEPT. 15	BOUNDARY.	2.5	124	12	112	-	10
	R1754	SEPT. 17		1.1	150	6	144	-	10

PORT ARTHUR - CURRENT RIVER

PC 2	R1610	SEPT. 9	UPSTREAM OF BOULEVARD PK.	1.5	90	12	78	2	100
	R1780	SEPT. 17		1.3	68	6	62	-	10
PC 1	R1603	SEPT. 9	DOWNSTREAM OF BOULEVARD PK.	1.2	84	12	72	4	100
PB.1	R1602	SEPT. 9	THUNDER BAY, MOUTH OF CURRENT R.	1.4	106	8	98	8	1,000
	R1687	SEPT. 15		2.6	-	10	-	10	10,000
	R1756	SEPT. 17		1.8	80	16	64	7	100,000

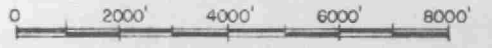


LEGEND

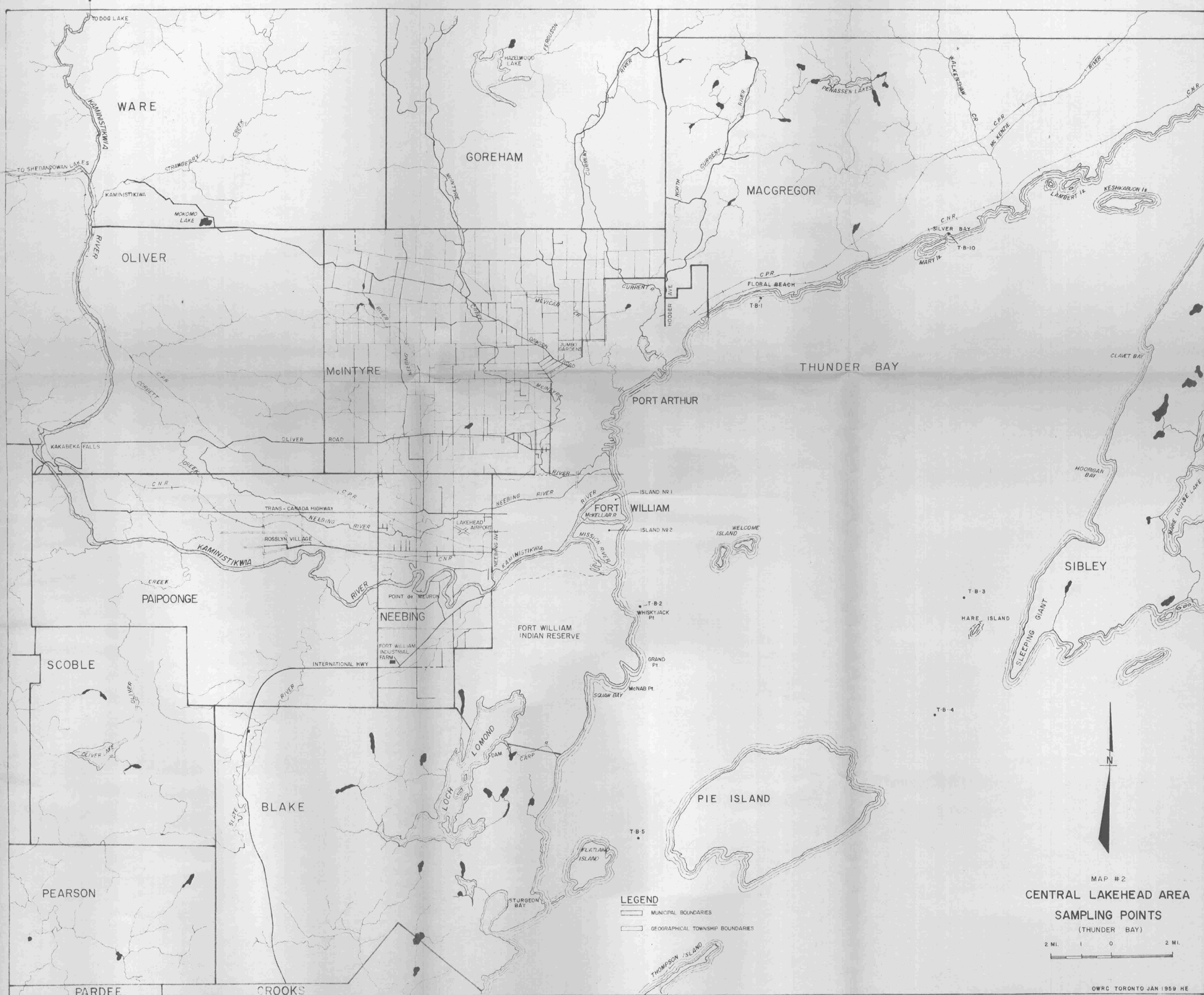
- APPROX POSITION OF PROPOSED RING ROAD LIMITED-ACCESS HWY
- ALTERNATE LOCATION OF RING ROAD
- MUNICIPAL BOUNDARY
- S.T.P.
- SEWAGE TREATMENT PLANT
- OUTLET

NOTE: SAMPLING POINTS - The initial of municipality and sequence no.
F - Fort William, P - Port Arthur, S - Shuniah, N - Neebing.

MAP #1
LAKEHEAD AREA
SAMPLING POINTS
(GENERAL)



OWRC TORONTO February 1959. S.H.



LEGEND
— MUNICIPAL BOUNDARIES
- - - GEOGRAPHICAL TOWNSHIP BOUNDARIES

MAP #2
CENTRAL LAKEHEAD AREA
SAMPLING POINTS
(THUNDER BAY)
2 MI. 1 0 2 MI.